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Probing the cell wall response of Sphagnum moss to a changing aqueous chemical environment. A synchrotron infrared microscopy study.

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Sphagnum is an important species of moss in peatland ecosystems and subsequently plays a vital role in carbon sequestration. Understanding its physiology is essential for predicting the possible impacts of a changing climate. In particular, the cell wall tissue of Sphagnum is composed of a high proportion of carboxylated polysaccharides, acting as ion exchangers, and is therefore sensitive to changes such as pH and metal ion concentrations in the surrounding environment. Using synchrotron infrared microscopy coupled with a flow-through liquid cell, the influence of pH and metal ions (Na^+ and Ca^{2+}) on the cell wall chemistry of freshly sectioned Sphagnum cristatum stems was investigated. The carboxylate functional groups in the cell wall were shown to behave as a monoprotic aliphatic acid with an acid dissociation constant (pK_a) of 4.97–6.04. Furthermore, the cell wall material showed a high affinity for calcium, with the binding constant (K) determined to be $10^{3.9}$ – $10^{4.7}$ for a 1:1 complex. These results allow for the prediction of environmental chemical conditions for which calcium uptake in Sphagnum can occur, and improves our ability to understand the patterns of distribution of Sphagnum in the environment.

¹Silvester *et al.* (2018) Environ. Chem. **15**, 513.

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